Take these in turn—the last-mentioned first. The Physical Laboratory has been but six years in existence; simply because it was impossible sooner to find any accommodation for it. One small room was obtained capable of holding a dozen students (at very high pressure). The success of the first year was so great that in the next session more than half of the applicants had to be refused admission; and as the demand grew, the working time allowed each student per day had to be further and further restricted, till, in the session just concluded, the lowest admissible limit (*one hour per day*) had at first to be adopted, and yet several applications for admission had to be refused. In spite of these drawbacks, much sound work has been done, and many of the Laboratory students have already obtained excellent posts connected with Astronomy, Telegraphy, Engineering, Sugar-refining, &c., mainly on account of the training they have received. The good thus done is to be measured, not by the mere fact of the success of these men in life, but by the fact that their success introduces into practical observatories, workshops, &c., men who have learned the reasons for the manipulations they employ, and who can therefore meet an emergency in ways which no rule-of-thumb teaching could possibly have suggested.

In Anatomy and Chemistry, practical teaching has long been established, and is afforded to every medical student and to such others as study these subjects as parts of a general scientific training. But it is necessary that a great deal more should be done in this direction, especially in the way of affording to advanced students opportunities of cultivating their own powers, and furthering Science by original research. The present arrangements render this possible only to a very limited extent.

Although practical instruction in Physiology, Pathology, and Pharmacology have not formed for so long a period as in Anatomy and Chemistry an integral part of a medical curriculum, yet the University authorities have recognised its importance and have introduced it as far as the meagre space at their disposal would admit. But the increasing demand for a practical training has overcrowded these rooms and made it imperative that additional accommodation should be provided, not only for tuition but for self-training and discovery.

Thus all the practical departments in both the physical and biological sciences urgently demand additional houseroom.

In conclusion, we would again call attention to the fact that one of the great reasons for the present appeal is to be found in the immense success of the University; its mere numerical growth has far exceeded the accommodation provided. But we would also specially note the fact that, although the scheme has just been launched, the contributions already received or promised amount to the very handsome, though of course utterly inadequate, sum of 60,000*l*. At least 40,000*l*. more, with the equivalent which may reasonably be expected from Government, are required to give us yet another University, furnished at least with buildings which will enable it to preserve for another century its well-deserved but hardly-won fame.

But it must not be forgotten that buildings alone, however perfect, are not sufficient for the work desired. The further extension of the teaching staff must inevitably follow. But questions of this nature, as well as the annual supply of funds for the purchase of apparatus and materials, will, we hope, be effectively treated by the Royal Commission on Science, whose Report on the Scottish Universities, and whose proposals for their adequate endowment, are, in the North at least, anxiously expected.

SCHORLEMMER'S "CHEMISTRY OF THE CARBON COMPOUNDS"

A Manual of the Chemistry of the Carbon Compounds; or, Organic Chemistry. By C. Schorlemmer, F.R.S., Lecturer on Organic Chemistry in the Owens College, Manchester. (London: Macmillan and Co, 1874.)

JUDGING from the rapidity with which text-books on Organic Chemistry have made their appearance of late, it might reasonably be inferred that a good treatise on that subject is much wanted. The student who turns eagerly to the present manual in the hope that the eminent author will help him out of some of his difficulties, and that he will find the subject treated in a novel manner, will however, we fear, feel somewhat disappointed.

The classification adopted by the author deals first with the compounds of carbon with oxygen, sulphur, and nitrogen; compounds which form the connecting link between inorganic and organic chemistry. He considers, justly, that a knowledge of the compound radicals into which these elements enter is essential to a proper understanding of a large number of other carbon compounds. He then describes the large group of fatty substances, subdivided again according to the quantivalence of their radicals, as well as the carbohydrates, terpenes, and camphors. The next division comprises compounds richer in carbon than the fatty substances, and which are not converted into such by the addition of hydrogen. These are again subdivided into several groups, including that of the aromatic compounds, which has been most fully investigated, and the group of compounds containing two or more aromatic nuclei linked together by carbon, and the glucosides. Lastly, we have a division of artificial and natural bases (alkaloids), of colouring and bitter principles, of compounds contained in bile and other secretions of the animal body, and of albumenoids and proteids.

It will be seen from this brief synopsis that the author deviates for the most part from the arrangement which has found favour with many modern writers on Organic Chemistry. Rather than treat of well-defined families of organic bodies, such as hydrocarbons, alcohols, ethers, aldehydes, ketones, acids, &c., he prefers to retain groups of homologous series, together with their derivatives. To the student this arrangement has the decided drawback that it involves much repetition in examining chemical changes, and, what is more important, it does not enable him to take in at a glance in what consists the similarity or dissimilarity between classes of bodies of analogous structure, and derived from a homologous parent stock; nor is it so easy to see where one or several links in the various homologous series are missing. The reward of grappling with the intricacies of organic bodies to which each worker is entitled who adduces new facts—no matter to how limited an extent—consists just in the intellectual treat of supplying perhaps some of these many missing links. There can be no question which system of classification will assist him to do this most speedily.

A student's perplexity will not be diminished on following our author into the vexed question of formulæ. We take it for granted that chemical formulæ have been devised to express the phenomena produced by the action of chemical force. That they express at present the final results rather than the agencies and forces which have been at work to produce them may likewise be taken as correct. They are, at the very best, poor representations only of the chemical changes which we witness daily. Whether it will ever be possible to prove that the atoms or groups of atoms of which chemical compounds are supposed to consist really stand to each other in certain definite relations, because they exhibit certain analogies under the influence of the chemical force which holds them together or loosens them, may well remain matter for speculation. As long as no differences of opinion respecting chemical facts are involved, views may differ on the mode of expressing them by formulæ, provided always that the choice between two different modes of expression falls upon the one which recalls the greatest number of analogies in the most simple and rational manner, and can therefore become more fruitful in new discoveries. Several rational formulæ are possible for one and the same compound according as different relations are to be expressed. A knowledge of the order or position of the atoms is out of the reach of experimental demonstration. If the so-called position-theory of the carbon atoms in certain organic compounds can assist us, however, in elucidating certain relations and analogies, and if this theory is leading rapidly to numerous new discoveries, then, by all means, let us avail ourselves of it. It seems that constitutional, or, as they are sometimes called, structural formulæ excite the ire of some of our critics of chemical literature inversely to the understanding they display of them, and the very name constitutional formula, or the sight of a graphic representation thereof, inflames their fury as violently as a red cloak excites an infuriated bull. However much ridicule may attach in the eyes of some people to constitutional or structural representation, it is pleasant to observe that the chemists who now dispense with it altogether form the exception rather than the rule.

Mr. Schorlemmer makes an especially liberal use of structural formulæ, showing the relative position and units of combining capacity of carbon atoms, with the view mainly of explaining isomeric bodies. Every student of organic chemistry will thank him for this, for, on perusing the journal of the Berlin Chemical Society, for instance, one cannot help being struck with the remarkable impulse which the conception of structural representation of the chemical composition of bodies has given to the study of organic chemistry in Germany. Chemists find it, no doubt, difficult to disengage themselves entirely from some of the various theories that have held sway during the last twenty years, and hence we look with leniency upon the want of uniformity of formulæ and chemical nomenclature displayed in this book. On pp. 3, 4, and 5, for instance, the brace is used in a double sense, showing the formation of molecular bodies by the direct combination of element with element as in $\left.\begin{matrix}H\\H\end{matrix}\right\}$, $\left.\begin{matrix}H\\Cl\end{matrix}\right\}$, $\left.\begin{matrix}K\\I\end{matrix}\right\}$; and again by uniting two or more elements with a polyvalent element, as in $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}N$, without any connection existing between the monad elements themselves other than through the polyad element. Such names as Tin chloride, $SnCl_4$, Platinum chloride, $PtCl_4$, and others, must create the impression that these are the only compounds which tin, &c. forms with chlorine. The different atomic groups in structural formulæ are sometimes separated by points, sometimes by lines (forks, prongs, or whiskers, as some fastidious critics have called them). In the absence of these various graphic representations free use is made of molecular formulæ; indeed it strikes us that the author has been often over-cautious, and has not attempted constitutional formulæ where such representation would appear of particular interest to the student, as, for instance, in the case of the isomers of aldehyde, of aldines, &c.

Certain groups of atoms contained in a great number of organic bodies, such as nitroxyl, NO_2, sulphuryl, SO_2, phosphoryl, PO, *may* be viewed otherwise than as monad, dyad, or triad compound radicals. Why, for instance, should PO in phosphorous acid be a triad radical when one of the hydrogen atoms is not replaceable, but "remains together" with the PO group? or in hypophosphorous acid, where two atoms of hydrogen remain linked to PO? Considering the liberality displayed by the author regarding formulæ, we shall be pleased to see him shake off the trammels which still encumber his inorganic compounds. We cannot see why NO_2 should combine with OH to form nitric acid, and with H to form nitrous acid, or why SO_2 should form the compound radical in $SO_2\left\{\begin{matrix}Cl\\Cl\end{matrix}\right.$ and in sulphuric acid $SO_2\left\{\begin{matrix}OH\\OH\end{matrix}\right.$, and also in sulphurous acid $SO_2\left\{\begin{matrix}H\\OH\end{matrix}\right.$. Our author writes ethyl nitrite $C_2H_5O.NO$, and not $C_2H_5NO_2$, "because in the former the N is linked to the ethyl by means of an atom of oxygen, whilst in the isomeric nitro ethane $C_2H_5N\left\{\begin{matrix}O\\O\end{matrix}\right.>$ the nitrogen is linked directly, and the oxygen atoms satisfy each other." We need scarcely say that this latter compound may also be viewed differently. We might greatly extend the list of similar incongruities, taking our examples especially from the organic silicon and boron compounds, which, more than anything else, show that the same idea of grouping elements that is now so freely admitted to prevail for carbon compounds must logically hold good also for inorganic bodies.

The nomenclature first proposed by Hofmann and adopted by our author of designating the different parallel hydro-carbon series by the terminations, ane, ene, ine, one, une has some inconveniences which perhaps are less apparent to the teacher than to the student of organic chemistry, who must be sorely puzzled to distinguish, for instance, between ethine and phosphine, stibine, oxytetraldine, &c.; and it is with regret we see some authors go even further, and substitute, for instance, iodethane for the familiar ethyl iodide, &c.

As constitutional or structural formulæ are intended to assist the student in the study of organic chemistry, we should have preferred if the well-understood abbreviations for compound radicals, advocated by some of our most eminent chemists, such as Et. for ethyl, Ay. for amyl, had been used. We observe, on p. 53, that Cfy. and Cfdy. are used for the compound cyanogen radicals; why should not constitutional formulæ generally be simplified by the use of abbreviations? The task of deciphering certain complex organic formulæ is already heavy enough, and some such shorthand expressions as the above will soon become all but indispensable. We do not for a moment blame the author alone for these sins of omission and commission. Our nomenclature and terminology are in such a state of confusion that a bold reformer should be welcomed rather than discouraged by every lover of our science.

We notice a few slips: On p. 7 "$C_n H_2 + {}_2$" should be $C_n H_{2n} + {}_2$; on p. 13 "monad and triad radicals cannot be isolated;" but at top of p. 14 we are told that "methyl combines with methyl, and we obtain ethane or ethyl hydride." Why methyl, &c., should not exist in a free or molecular state as much as hydrogen we are unable to see. On p. 67, the oxygen in the formula for guanidine should be omitted. On p. 72, "methyl iodide $2CH_3$" should be $2CH_3I$. On p. 111, "The vapour of ether is 2·557 times heavier than water." On p. 112 "triacetyl chloride" should be trichloracetyl chloride. On p. 135, "$C_6 H_{12} N$" is given in the equation, instead of $C_6 H_{12} N_2$. On p. 309, "$C_2 H_3 NH_2$" should be $C_2 H_5 NH_2$; and others which we will not mention.

We freely admit many commendable features in Mr. Schorlemmer's new book, which will render it extremely useful, especially to the student engaged in tracing the various isomerides, but we cannot help thinking that in some respects it does not come up to some works on organic chemistry which we already possess.

OUR BOOK SHELF

Dahomey as it Is: being a Narrative of Eight Months' residence in that country, with a full account of the notorious Annual Customs and the Social and Religious Institutions of the Ffons; also an Appendix on Ashantee, and a Glossary of Dahoman Words and Titles. By J. A. Skertchly. (London: Chapman and Hall, 1874).

MR. SKERTCHLY left England in 1871 for the purpose of making zoological collections on the West Coast of Africa. On his arrival at Whydah he was induced to go up to Abomey, the capital of Dahomey, for the purpose of instructing the king, Gelelé, in the use of some guns that had arrived, on the promise that he would be back at Whydah in eight days. The king, however, detained Mr. Skertchly as an unwilling guest for eight months, treating him with the greatest consideration and kindness, and creating him a prince of the country. The greater part of Mr. Skertchly's work is occupied with a description of the protracted annual "customs," as they are called, of Dahomey, which consist of elaborate and harmless trivial ceremonies, mixed up with much that is revolting and cruel; the details of these Mr. Skertchly describes in minute and often tiresome detail. We do not think there was any need for Mr. Skertchly making so large a book on what he saw, especially as the Dahomans and their "customs" are pretty well known through previous travellers. He often questions the accuracy of Burton, who is quite able to defend himself if he feels aggrieved at Mr. Skertchly's criticisms. The author succeeded, during his stay at Abomey, in doing but little in the way of collecting, and in this work there is scarcely any details as to the natural history of the country. He has evidently a considerable admiration both for the Dahomans and Ashantees, especially for the former, whom he considers not nearly so cruel as the latter, though both equally brave and remarkably well-disciplined as soldiers. In a short Appendix on the Ashantees, he prophecies that our recent expedition to the Gold Coast would find them formidable enemies, which prophecy can hardly be said to have been fulfilled. He defends the Dahomans from the charge of intentional cruelty in the barbarously performed human sacrifices which form so important a part of their customs, and we think he succeeds; the victims, who are all either criminals, or prisoners of war, are sent as messengers to deceased kings. The work is illustrated with a number of gorgeously coloured plates, which no doubt show faithfully the dresses and manners of the people, though some of the pictures which exhibit the method of sacrificing the human victims are simply revolting, and ought to have been confined to the author's portfolio.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

Fertilisation of the Fumariaceæ

I BEG permission to make a few remarks on Mr. J. Traherne Moggridge's statement (NATURE, vol. ix. p. 423) that the flowers of *Fumaria capreolata* are at first pale or nearly white, and only attain their brightest colouring, becoming even crimson, after the ovaries are set. He then adds:—"If the reverse had been the case there is little doubt that we should have regarded the bright colouring as specially adapted to attract insects." But does Mr. Moggridge know that these flowers are visited chiefly by diurnal insects? It has often been observed that flowers which are visited by moths are commonly white or very pale; but if they are odoriferous, they may be of any tint, even very dark or green. If therefore the flowers of the above Fumaria are visited by moths, it would be an injury to the plant had the flowers been from the first of a fine crimson. I have often seen bees sucking the flowers of the fumariaceous genera, *Corydalis*, *Dielytra*, and *Adlumia*; but many years ago I watched perseveringly the flowers of *Fumaria officinalis* and *parviflora*, and never saw them visited by a single insect; and I concluded from reasons which I will not here give (as I cannot find my original notes), that they were frequented during the night by small moths. Insects are not necessary for the fertilisation of *Fumaria officinalis*; for I covered up a plant, and it produced as many seeds as an uncovered one which grew near. On the other hand, with some species of *Corydalis*, the aid of insects is indispensable. With respect to the flowers of *F. capreolata* becoming brighter coloured as they grow old, we see the same thing in some hawthorns, and with the double rocket in our gardens. But is it surprising that this should sometimes occur with flowers, seeing that the leaves of a multitude of plants assume, as they become oxygenised, the most splendid tints during the autumn?

Down, Beckenham, Kent, April 6 CHARLES DARWIN

IN the vegetable kingdom we meet very commonly with gaily-coloured chemical products, essentially connected with the normal processes of development (the chlorophyll of most non-parasitic plants, the splendid rose pigments of Florideæ, the many lively-coloured pigments of lichens and fungi), and originating from venomous infection by insects (red-coloured galls of oak-leaves) or from decomposition (red pigments in autumnal leaves). In all these cases these colours appear to us to be merely an accidental quality of the chemical products, and we do not feel induced to start the question of what use any particular colour may be to the plant producing it. But it is quite otherwise with the gay colours of flowers. Bright colours in flowers which especially attract our attention and admiration are in most cases beneficial to the plant itself which produces